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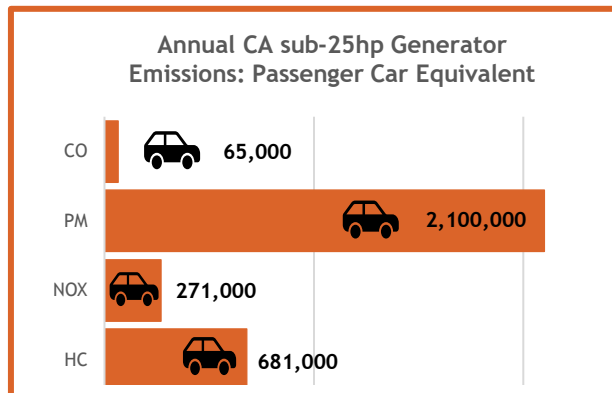


THE BIG PROBLEM WITH SMALL GENERATORS

A “2 Million Car” Emissions Opportunity

Field projects, power outages, special events, and urban construction often have one factor in common: small generators. Although ubiquitous and used in many applications, **small generators are a tremendously overlooked emissions reduction opportunity.** For a sense of scale, generators less than 25 horsepower (hp) in California emit the particulate matter (PM) equivalent of 2.1 million passenger vehicles.

The State of California continues to achieve significant greenhouse gas (GHG) emissions reductions from large-scale power generation, heavy-duty transit vehicles, light-duty consumer vehicles, and large mobile equipment. While the California Air Resources Board (CARB) has imposed emissions requirements on portable generator manufacturers, there are **few, if any, operating or permit requirements for portable generators below 25hp.** At first glance, these small generators would not appear to have significant air-quality impacts but their GHG and toxic pollutant output is disproportionately large.



Current estimates account for **just under 2 million small portable generators in the State of California** in this sub-25hp category. Even if these generators were in compliance with CARB’s highest Tier 4 emissions standards, their sheer number **emit the equivalent NO_x and unburned hydrocarbons annually as 271,000 and 681,000 passenger vehicles, respectively.** More significantly, **each sub-25hp generator emits more PM emissions in one year than a car.** Exposure to PM emissions results in well-documented chronic health impacts including asthma, cardiovascular and respiratory problems, and even death. These PM emissions are also recognized by CARB to be “associated with the greatest proportion of adverse health effects related to air pollution” with long-term exposure known to cause lung cancer. **Even the cleanest**

generators produce dangerous levels of carbon monoxide, which is known to cause headaches, nausea, and, in acute concentrations, asphyxiation or death.

While the measured emissions of sub-25hp generators is unfortunately comparable to that of automobiles, the health consequences are greatly amplified because generators are often emitting in close proximity to their operators. There are documented cases in other states of **homeowners dying due to carbon monoxide poisoning from the improper use of small portable generators - the same equipment that many Californians are increasingly turning to as solutions to utility Public Safety Power Shutoff (PSPS) events.** Construction workers, nearly 50% of whom earn less than California’s median income according to the Bureau of Labor Statistics, are often in proximity of this equipment as a part of their daily work and may not observe adequate distance from the emissions source to avoid dangerous exposure. **Simply operating a small portable generator for one hour in a typical garage-sized space produces double the OSHA exposure limit for carbon monoxide and as much PM pollutants as generated by driving a light-duty vehicle 200 miles.** These health consequences are real and immediate.

1 in 8 households in California has a small generator resulting in 370 million person-hours of emissions exposure per year.

Unfortunately, there are few zero-emissions portable power options currently available for California residents and businesses, and what is available largely does not serve the need. A sizeable **82% of sub-25hp generators are rated at 2-5hp and account for the bulk of consumer-grade and light industrial portable power equipment.** Current zero-emissions options in the market are either too small to offer substantial critical power, are much larger and require special equipment to mobilize, or are immobile and designed to be permanently affixed to a building. Similarly, fuel-cell generator alternatives are large and not practical for most users given the scarcity of hydrogen or natural gas fueling stations. **The lack of available options for portable clean power equipment is due, in large part, to three factors:** 1) **uncompetitive battery prices** versus fossil-fuel based options, 2) **no regulations for sub-25hp equipment** that require operators to purchase or use emissions-free options, and 3) **a lack of incentives for portable zero-emissions power equipment** that would enable new technology to achieve cost parity with fossil-fuel based options.



Rest assured, not all is doom and gloom. **California is expert at tackling climate challenges head-on with a solutions-oriented approach; this small generator emissions opportunity is no different.**

As California looks to combat the increasingly urgent climate and health problems associated with air pollution, numerous policies and incentives have been implemented to **confront the source: the combustion of fossil-fuel based products**. California's **Cap-and-Trade** program has both made the use of carbon-based fuels more economically difficult, and has resulted in the **Greenhouse Gas Reduction Fund**, which the State has used to advance distributed solar installation, electric vehicle adoption, and the reforestation of urban and rural environments. In June 2020, CARB unveiled the **Advanced Clean Truck Regulation**, which will require manufacturers of medium- and heavy-duty vehicles to sell zero and near-zero emissions vehicles in increasing percentages starting in 2024. Recognizing the costs currently associated with clean alternatives, CARB enables operators of electric vehicles to receive monetary benefits through its **Low Carbon Fuel Standard (LCFS)** program, which incentivizes the use of renewable fuels and electricity for transportation.

This **“regulate + incentivize”** approach to air quality policy has made California an example to the world in effective emissions reductions. In fact, CARB has already anticipated the need for incentives to procure clean alternatives to mobile power units (MPUs) by including them in the scope of the **Clean Off-Road Equipment (CORE) voucher program**, though **eligibility is limited for the replacement of power units greater than 25hp** (i.e. the generators that currently require permits to operate). But even where permits are impractical, such as for lawn and garden equipment, CARB has also taken action by using the **regional air districts to successfully provide incentives for the purchase of replacement and new electric-powered equipment**.

The same “regulate + incentivize” approach is needed for small generators.

The same **“regulate + incentivize”** approach is needed to address the serious health and environmental hazards associated with sub-25 hp fossil-fuel based generators. It is challenging, and often undesirable, to regulate individuals, but **both individuals and businesses that utilize portable power less than 25hp could be incentivized to transition to cleaner options**. Incentives based upon power or capacity could then be offered for eligible equipment purchase, a model that has worked well with both the **CORE and Self-Generation Incentive Program (SGIP)** initiatives that offer **vouchers and rebates ranging from \$400/kWh up to \$1,000/kWh**. Empowering customers to make the shift to safer and cleaner portable power alternatives likewise enables manufacturers to commit to offering market-based, high-performing solutions. A **voucher or incentive program of equivalent magnitude is recommended to provide Californians equitable access to cleaner alternatives to small portable fossil-fuel based generators** and to ensure that the resultant air and health benefits are available to all communities.

The prevalence of and need for portable power is only increasing, so the State of California has a **choice: allow small generators to continue creating big problems for the health of all Californians - or - apply the “regulate + incentivize” approach to address this exciting “2 Million Car” emissions reduction opportunity**. Which will it be?

ONYX POWER LLC (“ONYX”) is a minority-owned small business headquartered in Long Beach, CA. ONYX designs and manufactures zero-emissions, rugged and portable power equipment - a replacement for small generators.

References

- [California Census Quick Facts](#). United States Census Bureau.
- [Carbon Monoxide Poisonings Spike After Big Storms. Portable Generators Are A Culprit](#). NPR, 2019
- [EMERGENCY BACKUP POWER OPTIONS RESIDENTIAL](#). CALIFORNIA AIR RESOURCES BOARD.
- [Emission Impact: Additional Generator Usage Associated with Power Outage](#). California Air Resources Board, 2020
- [Estimated U.S. Average Vehicle Emissions Rates per Vehicle by Vehicle Type Using Gasoline and Diesel](#). Bureau of Transportation Statistics, 2018.
- [Inhalable Particulate Matter and Health](#). California Air Resources Board
- [Long- and Short-Term Exposure to PM_{2.5} and Mortality](#), Kloog, Ridgway, Koutrakis, Coull, and Schwartz, 2013.
- [May 2019 State Occupational Employment and Wage Estimates California](#). Bureau of Labor Statistics.
- [Preliminary Baseline Emissions for Small Off-Road Engines \(SORE2020\)](#). California Air Resources Board, March 25, 2020
- [Safety Standard for Portable Generators](#). Consumer Product Safety Commission, 2016.
- [Survey of Small Off-Road Engines \(SORE\) Operating within California: Results from Surveys with Four Statewide Populations](#). Social Science Research Center at California State University, Fullerton, 2019